harman/kardon

HKTS 5/HKTS 6

Home Theater Speaker System

SERVICE MANUAL

harman/kardon, Inc.
250 Crossways Park Dr.
Woodbury, New York 11797

Rev2 1/2004

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HKTS 5/HKTS6 System

Frequency Response
35Hz – 20kHz (–6dB)

Satellites

Recommended Power
10 – 70 watts
Impedance
8 ohms nominal
Sensitivity
86dB @ 1 watt/1 meter
Tweeter
One 1/2" dome, video-shielded
Midrange
One 3" driver, video-shielded
Dimensions (H x W x D)
4-5/8" x 3-1/8" x 3-3/4"
(117mm x 79mm x 93mm)
Weight
1.1 lb/0.5kg

Center

Recommended Power
10 – 70 watts
Impedance
8 ohms nominal
Sensitivity
86dB @ 1 watt/1 meter
Tweeter
One 1/2" dome, video-shielded
Midrange
Dual 3" drivers, video-shielded
Dimensions (H x W x D)
3-1/2" x 7-5/8" x 3-3/4"
(89mm x 194mm x 93mm)
Weight
1.89 lb/0.86kg

Subwoofer SUB-TS5/TS6

Amplifier
100 watts RMS
Woofer
10" woofer, bass-reflex enclosure
Dimensions (H x W x D)
15-3/4" x 15-3/4" x 16-3/4"
(400mm x 400mm x 425mm)
Weight
33.5 lb/15.2kg

Occasional refinements may be made to existing products without notice but will always meet or exceed original specifications unless otherwise stated

SUB-TS5/TS6 Amplifier 100w Powered Subwoofer Amplifier

LINE VOLTAGE	Yes/No	Hi/Lo Line	Unit	Notes	
US 120vac/60Hz	Yes	108-132	Vrms	Normal Operation	
Parameter	**Specification**	**Unit**	**QA Test Limits**	**Conditions**	**Notes**
Amp Section					
Type (Class AB, D, other)	AB	AB	n/a		External Sink required for Class AB
Load Impedance (speaker)	4	Ohms	n/a	Nominal	Z-curve required
Rated Output Power	100	Watts	95	1 input driven	
THD@ Rated Power	0.08	%	0.3	22k filter	
THD @ 1 Watt	0.1	%	0.5	22k filter	
DC Offset	10	mV-DC	20	@ Speaker Outputs	
Damping factor	>100	DF	50		Measured at speaker terminals, Output power 90 Watts THD 0.1 %
Input Sensitivity					
Input Frequency	50	Hz	50	Nominal Freq.	1 input driven
SUB Input	135	mVrms	±2dB	To Rated Power	SUB input driven only
Signal to Noise					
SNR-A-Weighted	100	dBA	90	rel. to rated power	A-Weighting filter
SNR-unweighted	80	dBr	75	rel. to rated power	22k filter
SNR @ 1W-unweighted	60	dBr	55	rel. to 1W Output	22k filter
Residual Noise Floor	1.5	mVrms	2.5	Volume @max, using RMS reading DMM/VOM (or A/P)	
Residual Noise Floor	1	mVrms(max)	2	Volume @max, w/ A/P Swept Bandpass Measurement (Line freq.+ harmonics)	
Input Impedance					
SUB Line input	>15	K ohms	n/a	Nominal	
Filters					
Low Pass (fixed or variable)	fixed	--	±2dB		
Slope & Q		dB/Octave	n/a		
Subsonic filter (HPF)		Hz	±2dB		
Slope & Q		dB/Octave	n/a		
Limiter (yes/no)	YES	--	n/a		
Features					
LFE Input	YES		functional		BW Limited to 500 Hz
Phase Switch (yes/no)	NO	--	functional		
Volume pot Taper (lin/log)	log	--	functional		
ATO	YES		functional		
Input Configuration					
SUB Line level	LFE		functional		Single RCA Input
Signal Sensing (ATO)					
Auto-Turn-On (yes/no)	YES	--	functional		
ATO Input Frequency	50	Hz	functional		
ATO Level	2	mV	functional	2mV@50Hz into Line Input w/ 1 ch. driven	
ATO Turn-on time	5	ms	functional	Amp connected and AC on, then input signal applied	
Auto Mute/ Turn-OFF Time	15	minutes	functional	T before muting, after signal is removed	Auto turn of time (T) must be 10 > T <15
Power on Delay time	3	sec.	functional	AC Power Applied	
Transients/Pops					
ATO Transient	5	mV-peak	10	@ Speaker Outputs	
Turn-on Transient	50	mV-peak	100	@ Speaker Outputs	AC Line cycled from OFF to ON
Turn-off Transient	50	mV-peak	100	@ Speaker Outputs	AC Line cycled from ON to OFF
Efficiency					
Stand-by Input Power	13	Watts	15	@ nom. line voltage	Maximum allowable input power under nominal Input voltage and frequency, HOT or COLD operation.
Power Cons.@rated power	185	Watts	195	@ nom. line voltage	100 Watts @ 4 Ohms nominal line voltage
Protection					
Short Circuit Protection	YES	--	functional	Direct short at output	
Thermal Protection	65 deg. C	--	functional	@1/8 max unclipped Power	Temperature rise should not exceed 35K rise
DC Offset Protection	YES	--	functional	DC present at Speaker Out leads	Relay or crowbar (for driver/fire protection)
Line Fuse Rating	2.5	Amps	2.5	Type-T or Slo Blo	External fuse with UL/SEMKO rated holder

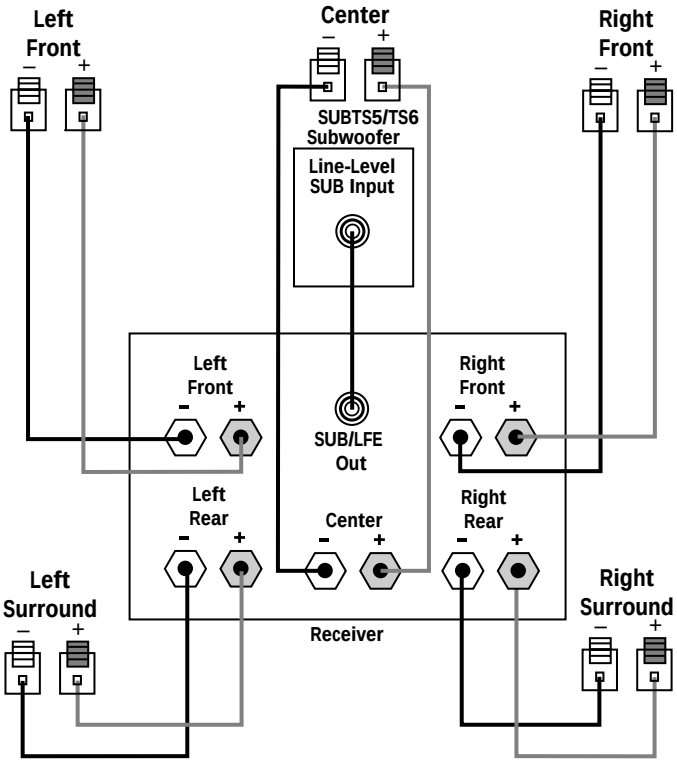
SPEAKER CONNECTIONS

Use the supplied RCA-type patch cord to connect the line-level SUB or LFE output on your receiver or amplifier to the SUB input on the SUB-TS5 or SUB-TS6 subwoofer.

Connect the satellite and center speakers to the corresponding speaker terminals on your receiver or amplifier.

Make sure that you have configured your surround sound processor for "Subwoofer On." The front left, front right, center and rear speakers should all be set to "Small."

When all connections have been made, plug the AC power cord on the subwoofer into an AC outlet.



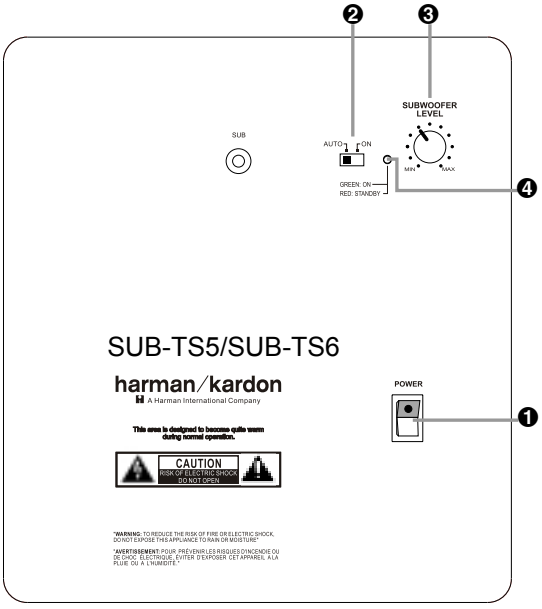
OPERATION

Move the Master Power switch (marked "Power" ❶) to the "•" (On) position. The HKTS 5/6 subwoofer will automatically turn itself on or go into Standby mode, depending on whether or not a signal is being sent to the HKTS 5/6 by your receiver or surround processor, and provided that the Auto/On switch ❷ is moved to the left so that it is in the "Auto" position.

When your receiver or amplifier is off, or is not sending program material to the subwoofer, the subwoofer will be in Standby mode and the LED ❹ on the amp panel will turn red. When the subwoofer senses an audio signal, it will automatically turn itself on and the LED ❹ will turn green. If the subwoofer does not sense a signal after approximately twenty minutes, it will automatically go into Standby mode.

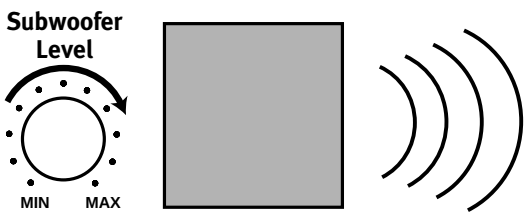
When the Auto/On switch ❷ is switched to the "On" position, the subwoofer will remain on, whether or not program material is playing.

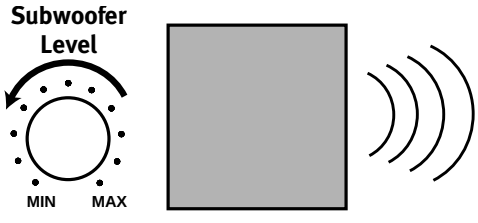
If you will be away from home for an extended period of time, or if the subwoofer will not be used, switch the Master Power switch ❶ to the "Off" position.



Volume

Volume can be adjusted using the Subwoofer Level Control ❸, as shown below.





TROUBLESHOOTING

If there is no sound from any of the speakers:

• Check that receiver/amplifier is on and a source is playing.

• Check that the powered subwoofer is plugged in and its Power switch ❶ is switched on to the "•" position.

• Check all wires and connections between receiver/amplifier and speakers. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.

• Review proper operation of your receiver/amplifier.

If there is no sound coming from one speaker:

• Check the "Balance" control on your receiver/amplifier.

• Check all wires and connections between receiver/amplifier and speakers. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.

• In Dolby* Digital or DTS® mode, make sure that the receiver/processor is configured so that the speaker in question is enabled.

• Turn off all electronics and switch the speaker in question with one of the other speakers that is working correctly. Turn everything back on, and determine whether the problem is in the same place: i.e., the speaker that was working previously now has no sound and the speaker that was not working now sounds fine; or whether it has moved: i.e., the speaker that was not working still has no sound and the speaker that was working is still fine. If the problem is in the same place, the source of the problem is most likely with your receiver or amplifier, and you should consult the owner's manual for that product for further information. If the problem has followed the speaker, consult your dealer for further assistance or, if that is not possible, visit our Web site at www.harmankardon.com for further information.

If there is no sound from the center speaker:

• Check all wires and connections between receiver/amplifier and speaker. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.

• If your receiver/processor is set in Dolby Pro Logic* mode, make sure the center speaker is not in phantom mode.

• If your receiver/processor is set in Dolby Digital or DTS mode, make sure the receiver/processor is configured so that the center speaker is enabled.

If the system plays at low volumes but shuts off as volume is increased:

• Check all wires and connections between receiver/amplifier and speakers. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.

• If more than one pair of main speakers is being used, check the minimum impedance requirements of your receiver/amplifier.

If there is low (or no) bass output:

• Make sure the SUB input of the SUB-TS5/6 subwoofer and SUB or LFE output of your receiver or amplifier are properly connected by the RCA-type patch cord.

• Make sure the connections to the Speaker Inputs have the correct polarity (+ and –).

• Make sure the subwoofer is plugged into an active electrical outlet and its Power switch ❶ is switched on to the "•" position.

• Check the speaker setup (bass management) settings in your AVR receiver or processor to make certain that the front, center and surround speakers are configured for "Small," and that the subwoofer is set for "Yes" or "On."

If there is no sound from the surround speakers:

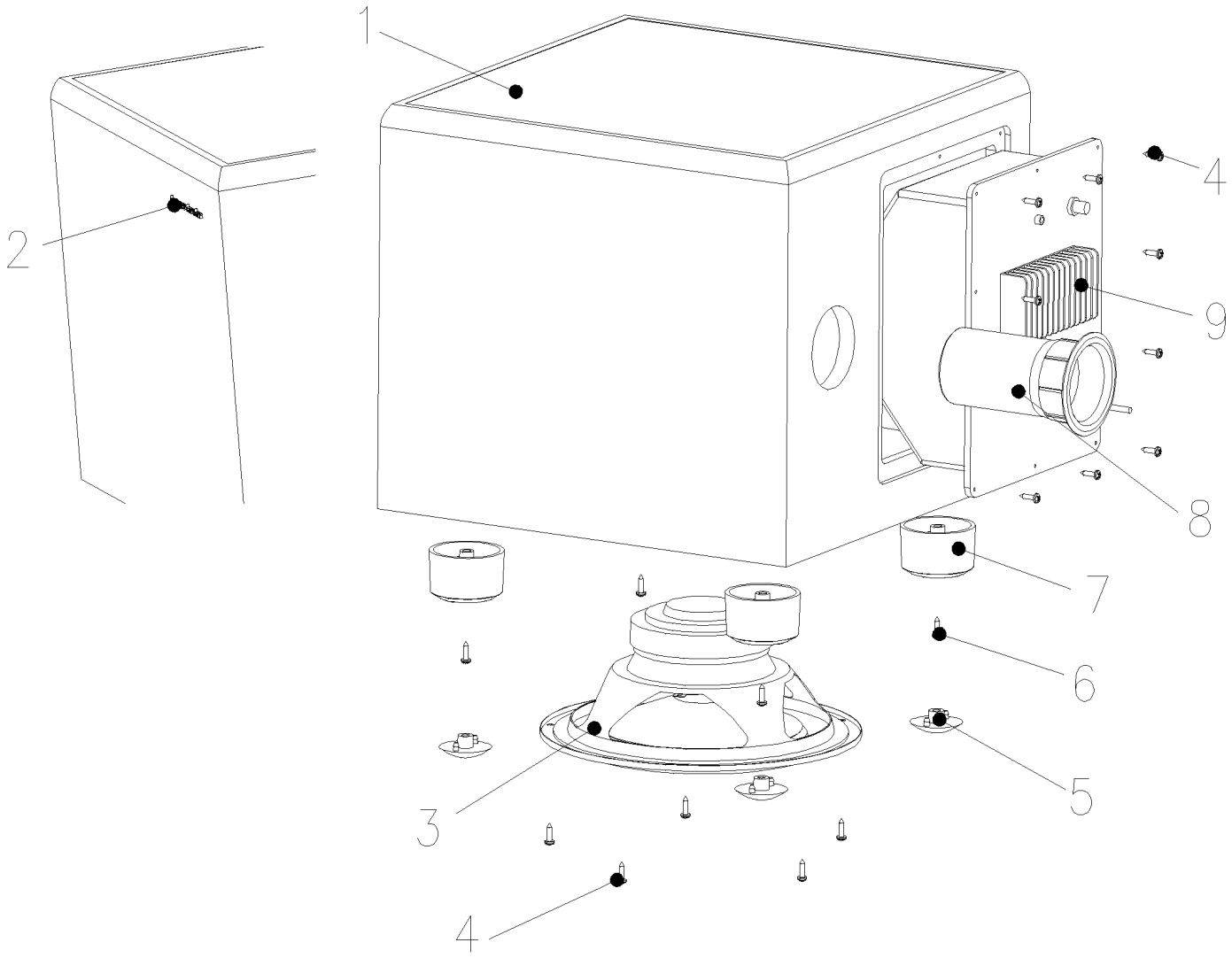
• Check all wires and connections between receiver/amplifier and speakers. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.

• Review proper operation of your receiver/processor and its surround sound features.

• Make sure the movie or TV show you are watching is recorded in a surround sound mode. If it is not, check to see whether your receiver/processor has other surround modes you may use.

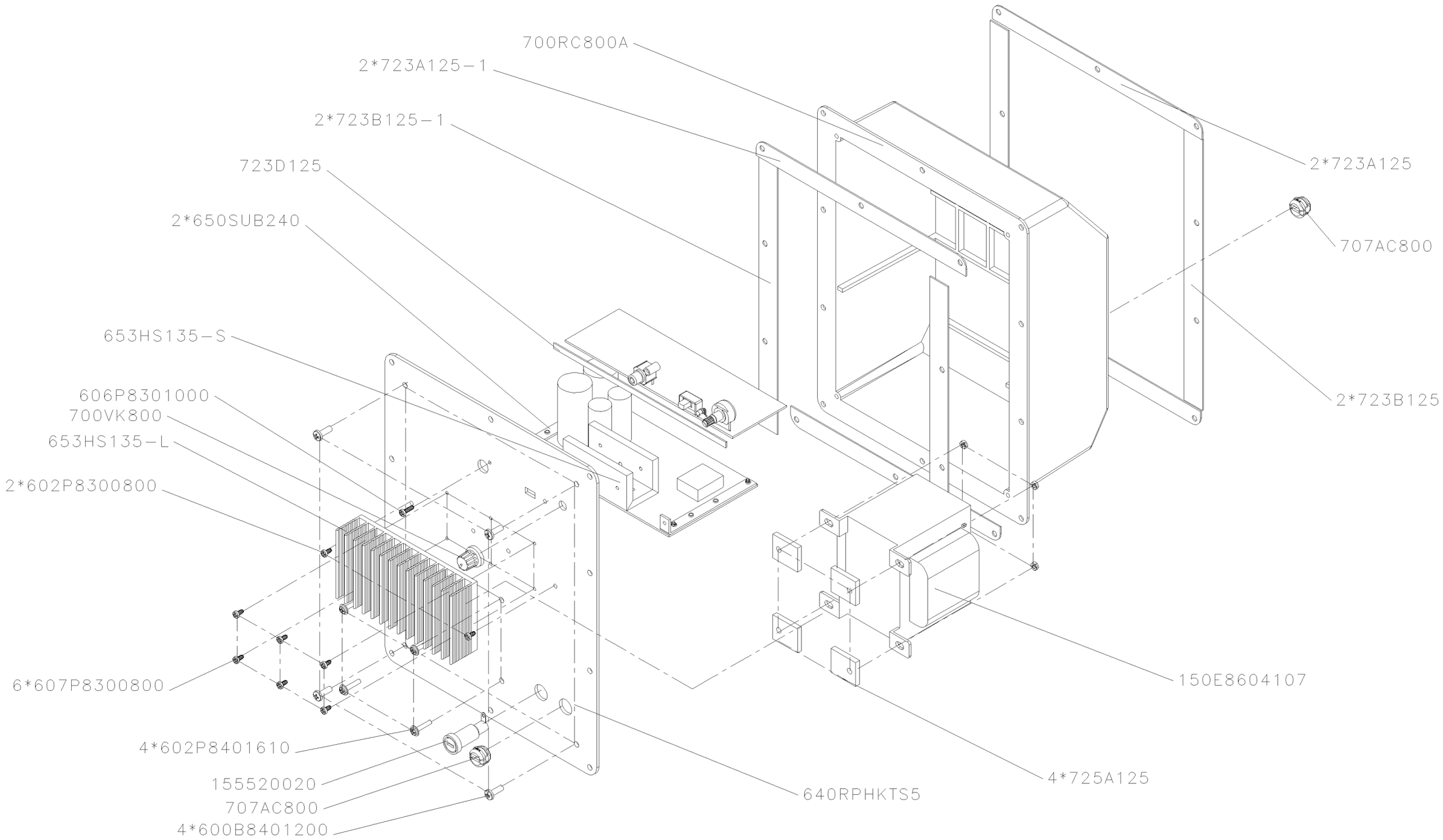
• In Dolby Digital or DTS mode, make sure your receiver/processor is configured so that the surround speakers are enabled.

• Review the operation of your DVD player and the jacket of your DVD to make sure that the DVD features the desired Dolby Digital or DTS mode, and that you have properly selected that mode using both the DVD player's menu and the DVD disc's menu.

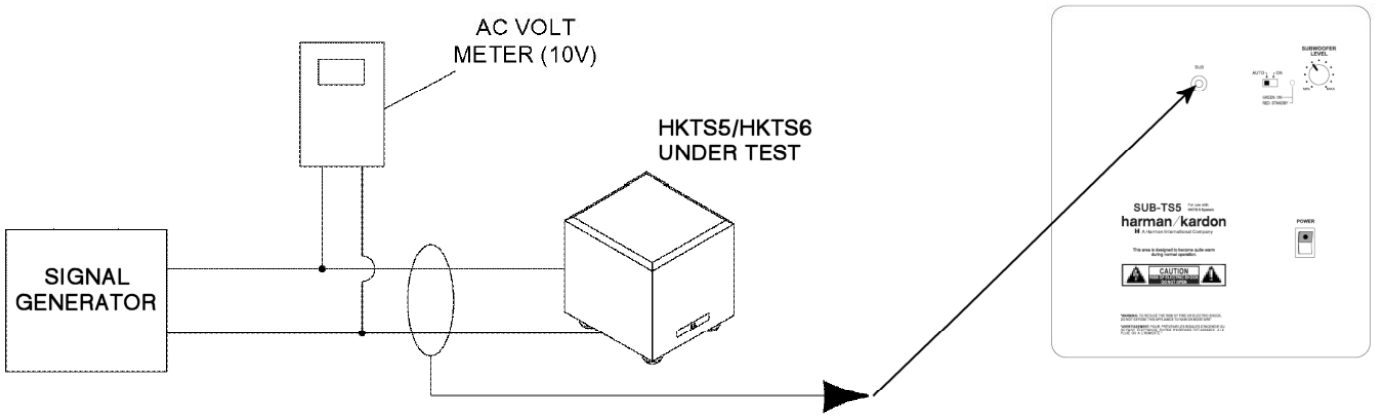


Ref.	Part Number	Description	Qty
#1	Not For Sale	HKTS5/HKTS6 Enclosure	1
#2	(HKTS5) sz5321	HK Logo	1
	(HKTS6) sz5930	HK Logo	1
#3	25MF10DZB-DW02	10" woofer (DCR = 3.4 ohms ±10%)	1
#4	06-t4205012	Amplifier/woofer screw t4*20	15
#5	wi5448	Foot (bumper)	4
#6	06-t5345005	Foot screw	4
#7	wi5447	Rubber foot	4
#8	wi5600	Port Tube	1
#9	Not For Sale	HKTS5/HKTS6 Amplifier Assembly	1

SUB-TS5/SUB-TS6 EXPLODED VIEW



HKTS 5/HKTS 6 TEST PROCEDURE



Equipment needed:

- Function/signal generator/sweep generator
- Integrated Amplifier
- Multimeter
- Speaker cables
- Single RCA cable

General Unit Function (UUT = Unit Under Test)

1) From the signal generator, connect one line level (RCA) cable to the single SUB input.
2) On the front of the unit, turn the LEVEL control full counterclockwise.
3) Turn on generator, adjust to **150mV, 50 Hz**.
4) Plug in UUT; turn the power switch ON. LED should be Red. Turn LEVEL control full clockwise (MAX)
5) LED should now be Green; immediate bass response should be heard and felt from port tube opening.
6) Turn off generator, turn VOLUME control fully counterclockwise, disconnect RCA cable.

Sweep Function

1) Follow steps 3-6 above, using a sweep generator as a signal source.
2) Sweep generator from 20Hz to 300Hz. Listen to the cabinet and drivers for any rattles, clicks, buzzes or any other noises. If any unusual noises are heard, remove woofers and test.

Driver Function

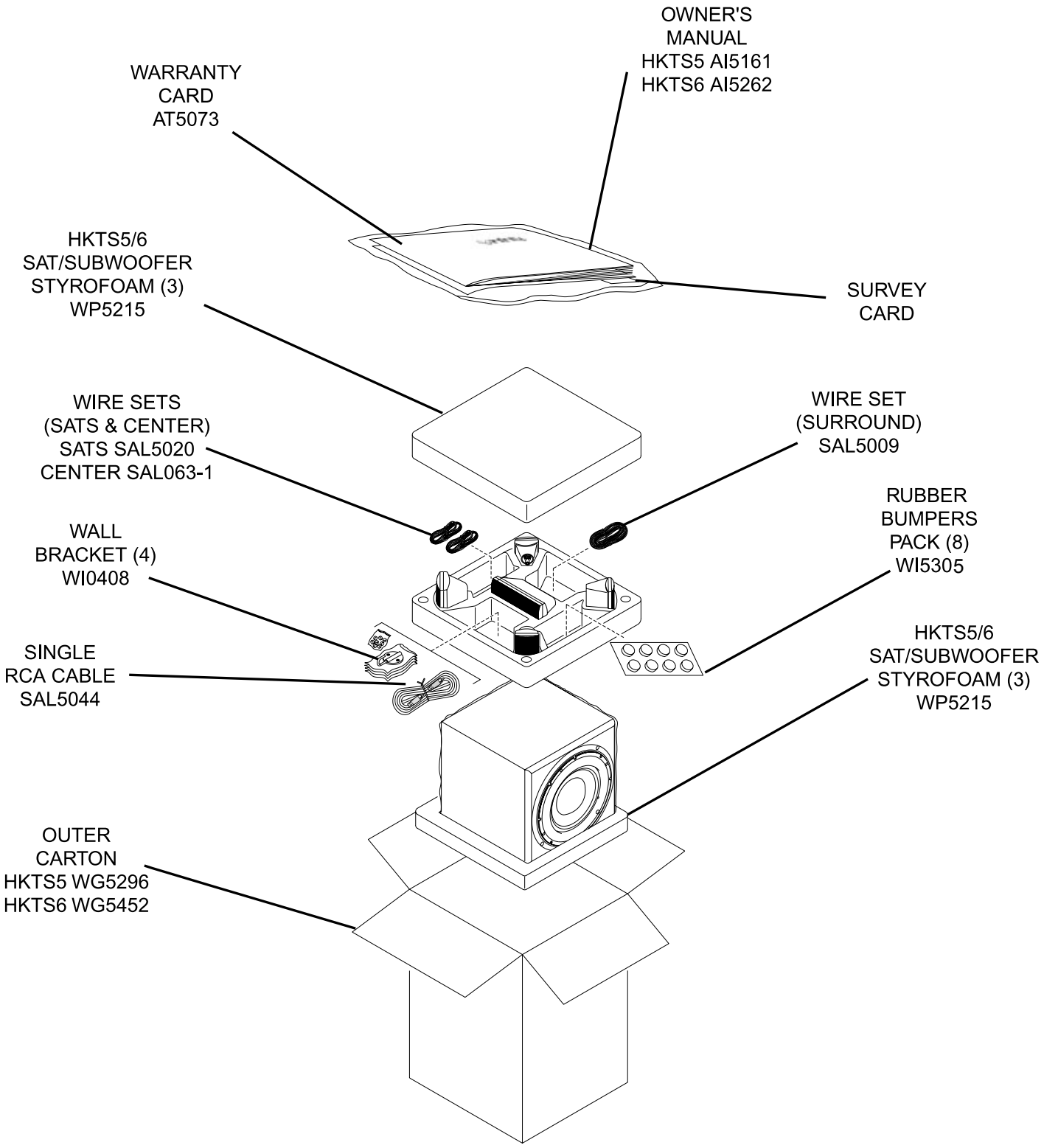
1) Remove woofer from cabinet; detach + and - wire clips.
2) Check DC resistance of woofer; it should be **3.4 ohms** ±10%
3) Connect a pair of speaker cables to driver terminals. Cables should be connected to an integrated amplifier fed by a signal generator. Turn on generator and adjust so that speaker level output is **5.0**V.
4) Sweep generator from 20Hz to 1kHz. Listen to driver for any rubbing, buzzing, or other unusual noises.
5) Caution: when re-connecting woofer wires, observe proper polarity, as Faston connectors are the same size; red wire should connect to terminal with red dot.

MECHANICAL/SATELLITE PARTS LIST

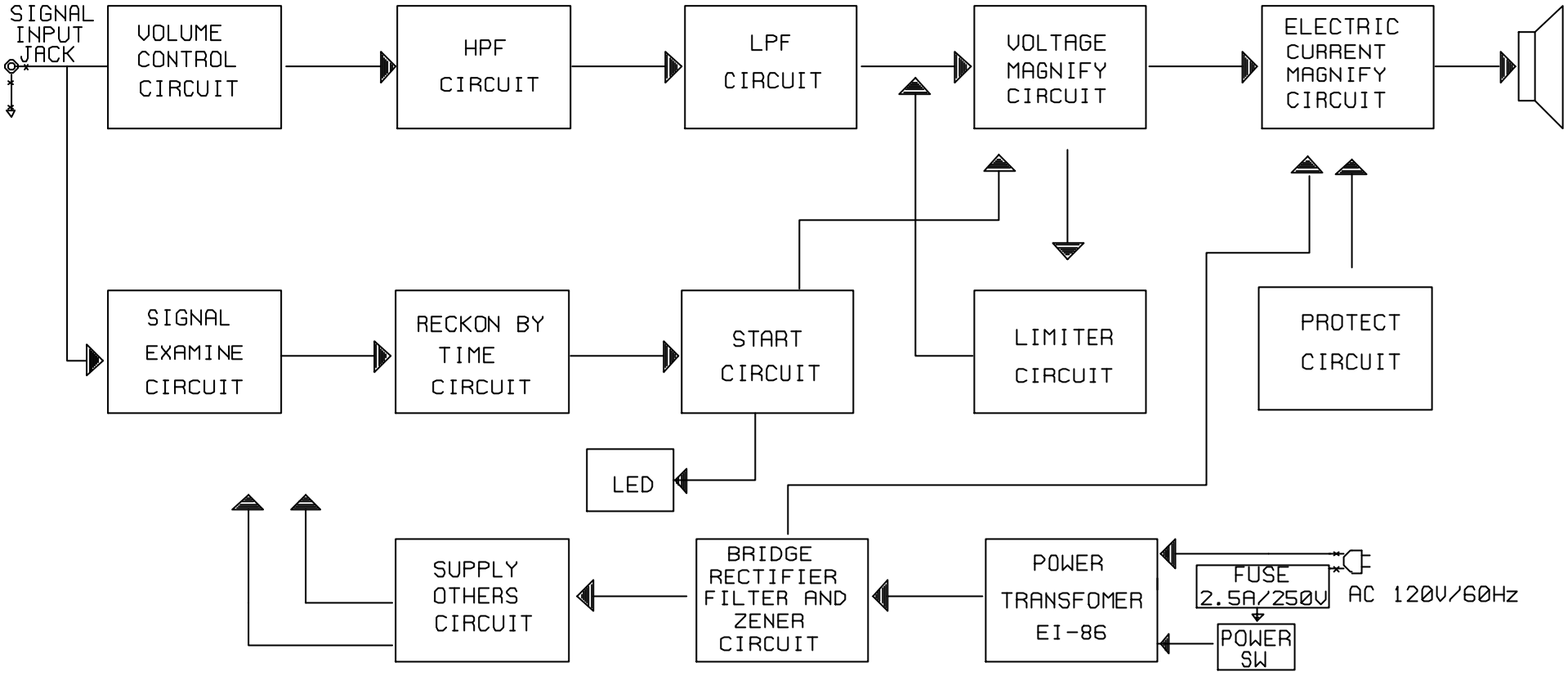
Part number	Description
SATELLITES	
HKTS 5/SAT-TS5	Complete satellite loudspeaker
HKTS 6/SAT-TS6	Complete satellite loudspeaker
22PF48JA-FW02	Woofer for Sats
g255002	grille
sz5322	logo for HKTS 5/SAT-TS5
sz5928	logo for HKTS 6/SAT-TS6
xc255002	front enclosure
xd255000	back enclosure
wi0409	Wall-mount bracket for HKTS 5/SAT-TS5
wi5969	Wall-mount bracket for HKTS 6/SAT-TS6
CENTER	
HKTS 5/CEN-TS5	Complete Center loudspeaker
HKTS 6/CEN-TS6	Complete Center loudspeaker
22PF48JA-DW06	Woofer for Center
g255003	grille
xc255001	front enclosure
xd255001	back enclosure
sz5371	logo for HKTS 5/CEN-TS5
sz5929	logo for HKTS 5/CEN-TS6
SUB-TS5/TS6 SUBWOOFER EXTERNAL & HKTS5/HKTS6 PACKAGING	
25MF10DZB-DW02	10" woofer
wi5447	Rubber foot (4)
wi5448	foot (4)
sz5321	logo
ai5161	Owner's manual (HKTS5)
ai5262	Owner's manual (HKTS6)
wg5296	Outer carton (HKTS5)
wg5452	Outer carton (HKTS6)
at5073	warranty card
wp5215	Foam set
sal063-1	Wire set 20' (center)
sal5009	Wire set 40' (surround)
sal5020	Wire set 15' (front satellites)
sal5044	Single RCA cable

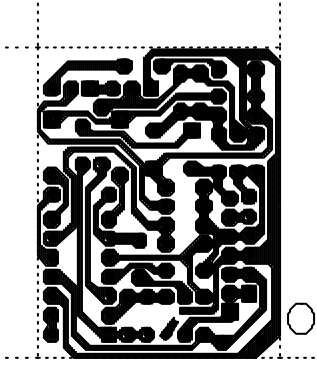
OPTIONAL: Floor Stands for HKTS 5/SAT-TS5 satellites - FSTS1

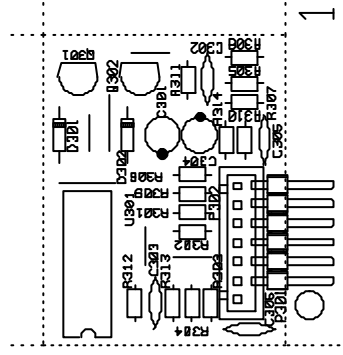
Packaging


OWNER'S MANUAL
HKTS5 AI5161
HKTS6 AI5262
WARRANTY CARD
AT5073
HKTS5/6 SAT/SUBWOOFER STYROFOAM (3)
WP5215
SURVEY CARD
WIRE SETS (SATS & CENTER)
SATS SAL5020
CENTER SAL063-1
WIRE SET (SURROUND)
SAL5009
RUBBER BUMPERS PACK (8)
WI5305
WALL BRACKET (4)
WI0408
SINGLE RCA CABLE
SAL5044
HKTS5/6 SAT/SUBWOOFER STYROFOAM (3)
WP5215
OUTER CARTON
HKTS5 WG5296
HKTS6 WG5452

BLOCK DIAGRAM



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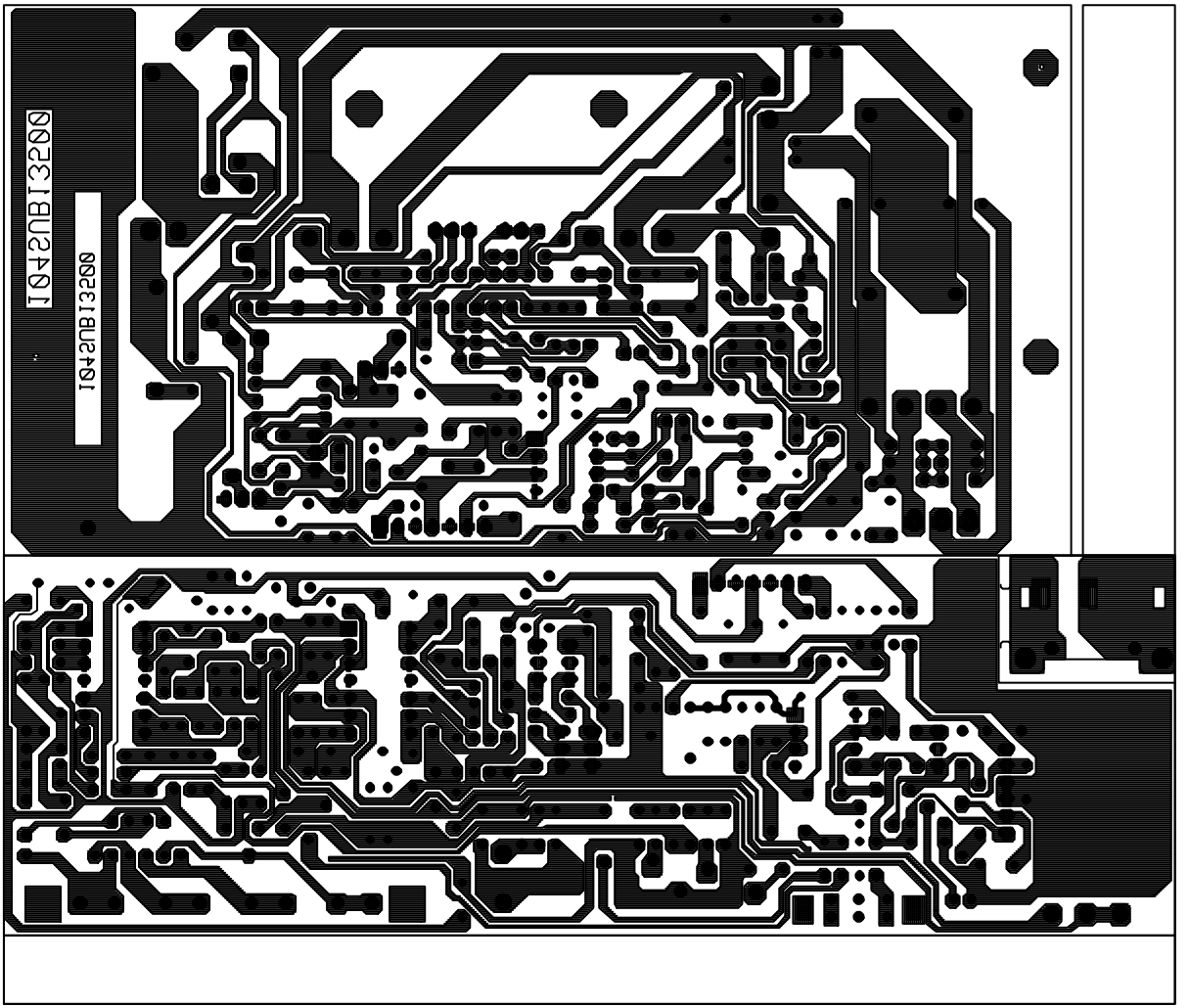
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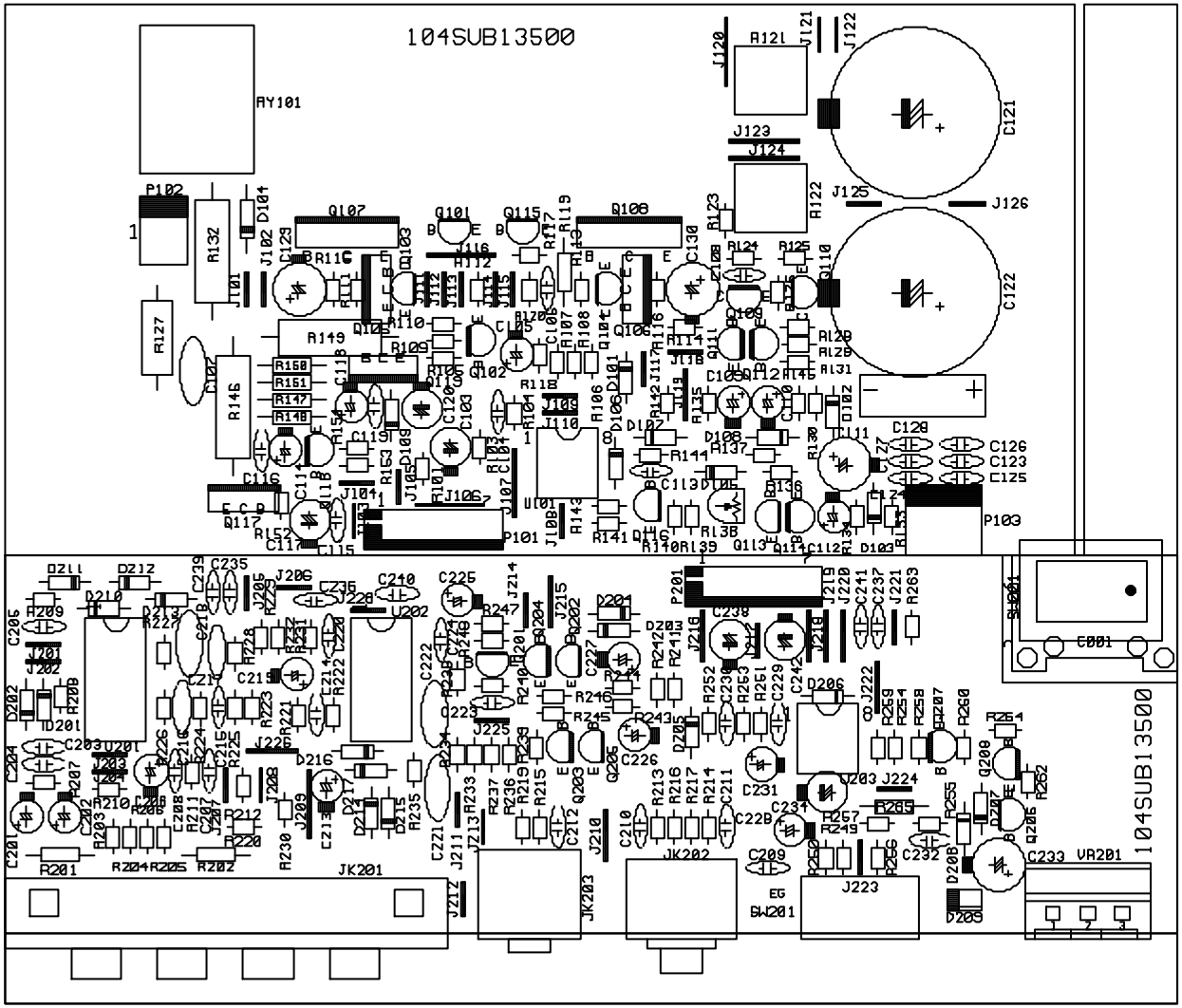
IS42VBI3200


104SUB13500
104SUB13500

SUB-TS5/TS6 Electrical Parts List

PART NO.	DESCRIPTION	QTY	Reference Designator
Resistors			
11014152j26	RESISTOR 1.5K 1/4W ±5% CF	1	R265
11014472j26	RESISTOR 4.7K 1/4W ±5% CF	2	R147,150
11014681j26	RESISTOR 680 ohms 1/4W ±5% CF	2	R148,151
11016101j26	RESISTOR 100 ohms 1/6W ±5% CF	2	R120,215
11016102j26	RESISTOR 1K 1/6W ±5% CF	2	R124,254
11016103j26	RESISTOR 10K 1/6W ±5% CF	8	R134,230,232,235,237,240,260,264
11016105j26	RESISTOR 1M 1/6W ±5% CF	2	R143,259
11016123j26	RESISTOR 12K 1/6W ±5% CF	2	R135,139
11016124j26	RESISTOR 120K 1/6W ±5% CF	1	R233
11016151j26	RESISTOR 150 ohms 1/6W ±5% CF	1	R253
11016152j26	RESISTOR 1.5K 1/6W ±5% CF	6	R103,123,136,137,141,142
11016153j26	RESISTOR 15K 1/6W ±5% CF	5	R118,145,152,154,234
11016154j26	RESISTOR 150K 1/6W ±5% CF	2	R131,252
11016181j26	RESISTOR 180 ohms 1/6W ±5% CF	2	R111,114
11016182j26	RESISTOR 1.8K 1/6W ±5% CF	1	R153
11016183j26	RESISTOR 18K 1/6W ±5% CF	2	R238,262
11016205j26	RESISTOR 2.0M 1/6W ±5% CF	1	R257
11016223j26	RESISTOR 22K 1/6W ±5% CF	5	R128,129,133,255,263
11016332j26	RESISTOR 3.3K 1/6W ±5% CF	3	R106,107,144
11016392j26	RESISTOR 3.9K 1/6W ±5% CF	2	R105,108
11016393j26	RESISTOR 39K 1/6W ±5% CF	1	R126
11016470j26	RESISTOR 47 ohms 1/6W ±5% CF	4	R112,113,115,116
11016471j26	RESISTOR 470 ohms 1/6W ±5% CF	1	R140
11016472j26	RESISTOR 4.7K 1/6W ±5% CF	4	R110,125,130,258
11016473j26	RESISTOR 47K 1/6W ±5% CF	4	R101,219,250,251
11016560j26	RESISTOR 56 ohms 1/6W ±5% CF	1	R117
11016563j26	RESISTOR 56K 1/6W ±5% CF	1	R104
11016682j26	RESISTOR 6.8K 1/6W ±5% CF	1	R109
11010821jk1	RESISTOR 820 ohms 1W ±5%	1	R132
110122r2j15	RESISTOR 2.2 ohms 1/2W ±5%	1	R127
11016332j26	RESISTOR 3.3K 1/6W ±5% CF	1	R266
11020331jk2	RESISTOR 330 ohms 2W ±5%	1	R146
11020331jk3	RESISTOR 330 ohms 2W ±5%	1	R149
11350r10j20	CEMENT RESISTOR 0.1 ohms 5W ±5%	2	R121,122
11403302m0	POT 3K 0.3W ±20%	1	R138
115h503a101	VARIABLE RESISTOR D16 50K/1 A	1	VR201

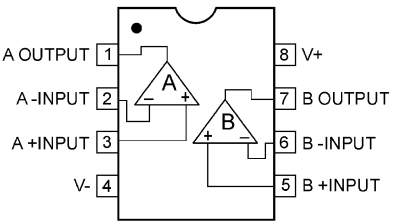
PART NO.	DESCRIPTION	QTY	Reference Designator
Capacitors			
1302b101k503	100pf 50V ±10%	1	C220
1302b102k503	1000pf 50V ±10%	1	C116
1302b221k503	220pf 50V ±10%	2	C212,230
1302f104z503	0.1uf 50V +80/-20%	9	C108,113,115,119,232,236,237,240,241
1303f473m503	0.047uf 50V ±20%	1	C106
130sl470k503	47pf 50V +350/-1000 ±10%	1	C229
132104j503	0.1uf 50V ±5%	4	C107,221,222,224
132223ja03	0.022uf 100V ±5%	4	C124,125,126,128
132473j503	0.047uf 50V ±5%	1	C223
1353105m50	1uf 50V	3	C105,112,228
1353106m50	10uf 50V	2	C219,231
1353107m16	100uf 16V	6	C109,117,120,234,238,242
1353226m50	22uf 50V	2	C114,118
1353227m10	220uf 10V	2	C129,130
1353227m16	220uf 16V	2	C111,233
1353476m25	47uf 25V	1	C103
1302g472md00	4700pf 400V ±20%	1	
132223ja03	0.022uf 100V ±5%	2	C123,127
1353107m16	100uf 16V	1	C110
1353226m50	22uf 50V	1	C225
1354688m50	6800uf/50V	2	C121,122
Semiconductors			
192027c1815gr	2SC1815GR NPN TRANS	8	Q102,111,112,113,118,206,207,208
192028a1015gr	2SA1015GR PNP TRANS	2	Q114,116
1921672n5551	2N5551 NPN TRANS	2	Q103,109
1921682n5401	2N5401 PNP TRANS	2	Q104,110
197131n4148	1N4148	9	D101,103,105,108,206,207,208,214,215
19915000335	3.3V 1/2W ZENER	2	D102,205
19915000625	6.2V 1/2W ZENER	2	D106,107
19915001605	16V 1/2W ZENER	1	D109
19016tl074cn	TL074CN QUAD OP-AMP	1	U202
192011d669a	2SD669A NPN TRANS	1	Q106
192012b649a	2SB649A PNP TRANS	1	Q105
192021c1815gr	2SC1815GR NPN TRANS	2	Q101,115
192021tip35c	TIP35C NPN TRANS	1	Q107
192022tip36c	TIP36C PNP TRANS	1	Q108
192201d882y	KSD882Y NPN TRANS	1	Q117
192202b772y	KSB772Y PNP TRANS	1	Q119
19006m4558d	OPA 4558D DUAL OP-AMP	2	U101,203

PART NO.	DESCRIPTION	QTY	Reference Designator
19510204hgw	LED 204HGW	1	D209
19700kbl405	4A 500V KBL405 BRIDGE	1	D110
197101n4002	1N4002	1	D104
Miscellaneous			
171udhss124d	5A 24V UDH-SS124D RELAY	1	RY101
1740rcb242vpg	JACK RCB	1	JK203
180tms7210v	SWITCH SLIDE MS7210V	1	SW201
150e8604107	TRANSFORMER	1	
152u602015	LINE CORD SVT FT-2 6FT	1	
154u25006t0	FUSE 2.5A 250V 20mm	1	FS101
155520020	FUSE HOLDER R3-11	1	
180pbr12c11s	PUSH SW BR12C11S	1	SW101
LIMITER PCB			
11016103j26	RESISTOR 10K 1/6W ±5% CF	7	R301,302,303,304,308,309,314
11016223j26	RESISTOR 22K 1/6W ±5% CF	2	R310,312
11016333j26	RESISTOR 33K 1/6W ±5% CF	1	R305
11016474j26	RESISTOR 470K 1/6W ±5% CF	1	R307
11016751j26	RESISTOR 750 ohms 1/6W ±5% CF	2	R311,313
11016755j26	RESISTOR 7.5M 1/6W ±5% CF	1	R306
1302f104z503	0.1uf 50V +80/-20%	2	C305,306
132103j503	0.01uf 50V ±5%	2	C302,3
1353226m50	22uf 50V ±20%	1	C301
1353476m25	47uf 25V ±20%	1	C304
192027c1815gr	2SC1815GR B91	2	Q301,302
197131n4148	1N4148	2	D301,302
1759f40hr2	40PIN PITCH=2.54mm HR2*4	0.15	P301
19016tl074cn	TL074CN QUAD OP-AMP	1	U301

Integrated Circuit Diagrams

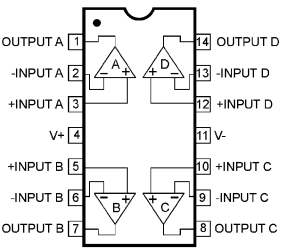
4558 Dual Op Amp

U101,203



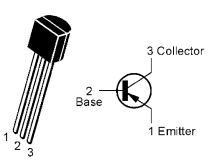
OPAMP, QUAD 14P DIL TL074

U202, 301



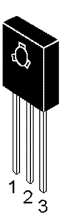
2N5401

Q104,110



2SD669A,2SB649A,
KSD882Y,KSB772Y

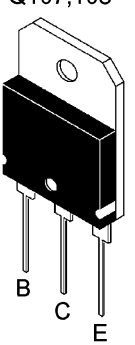
Q105,106,117,119



1. Emitter
2. Collector
3. Base

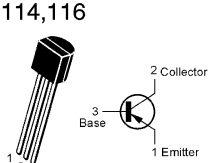
TIP 35C, TIP 36C

Q107,108



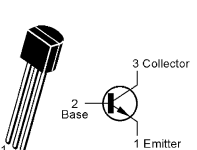
2SA1015

Q114,116



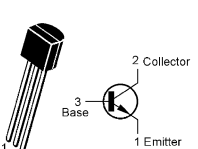
2N5551

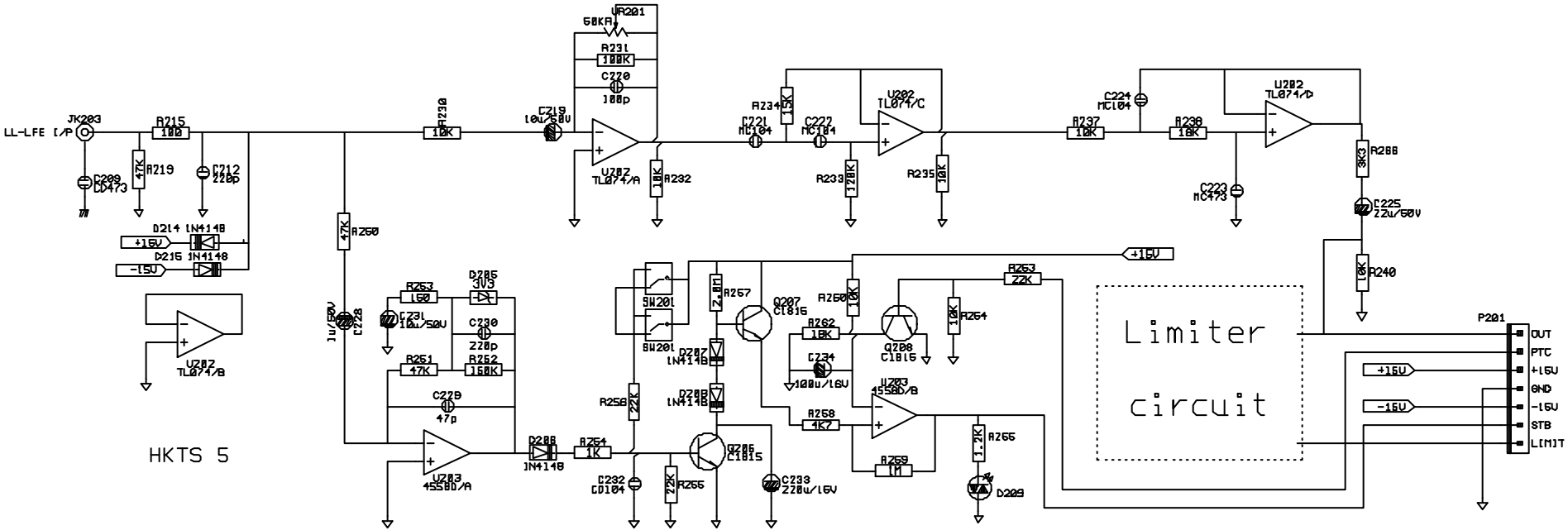
Q103,109

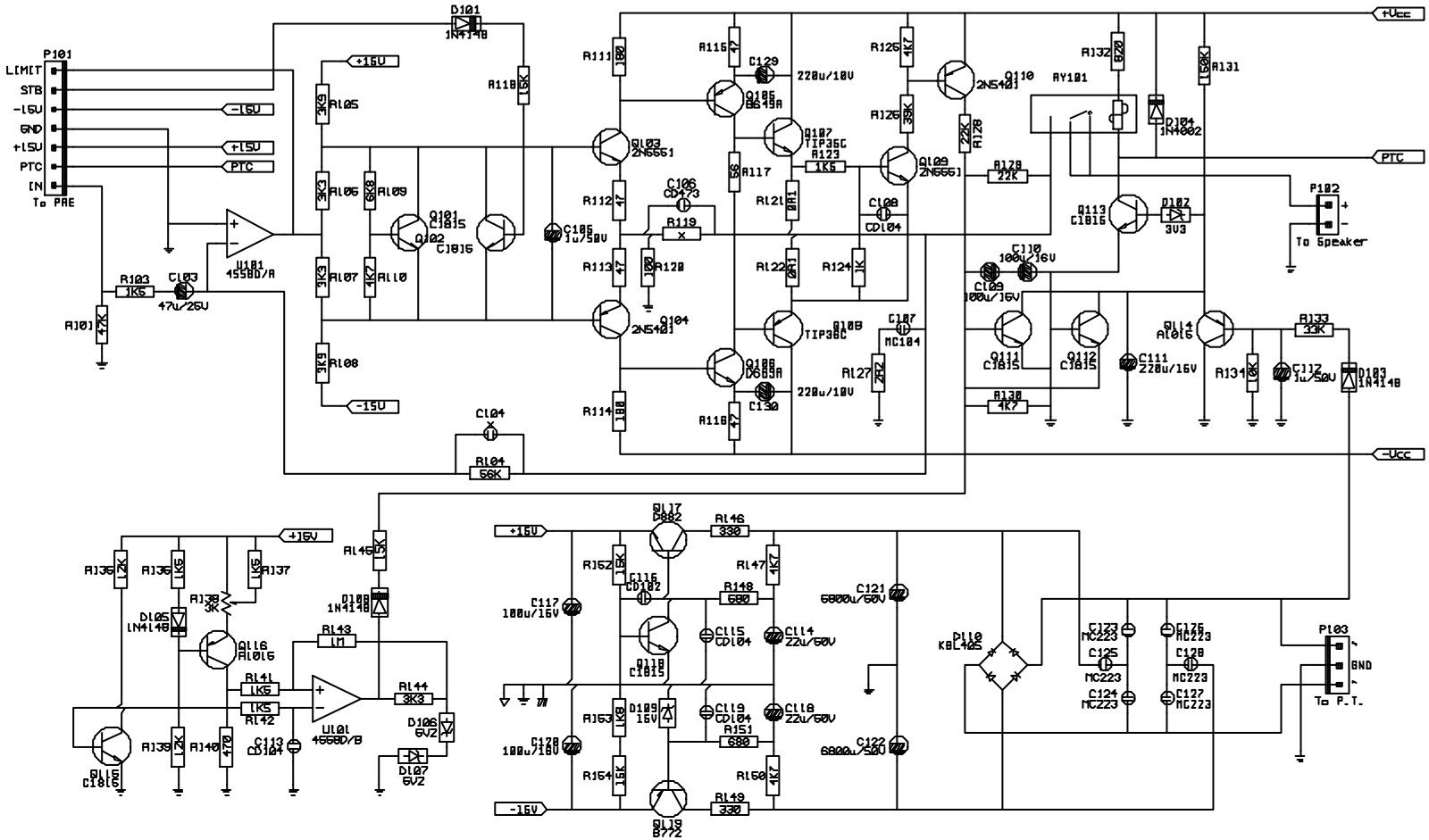


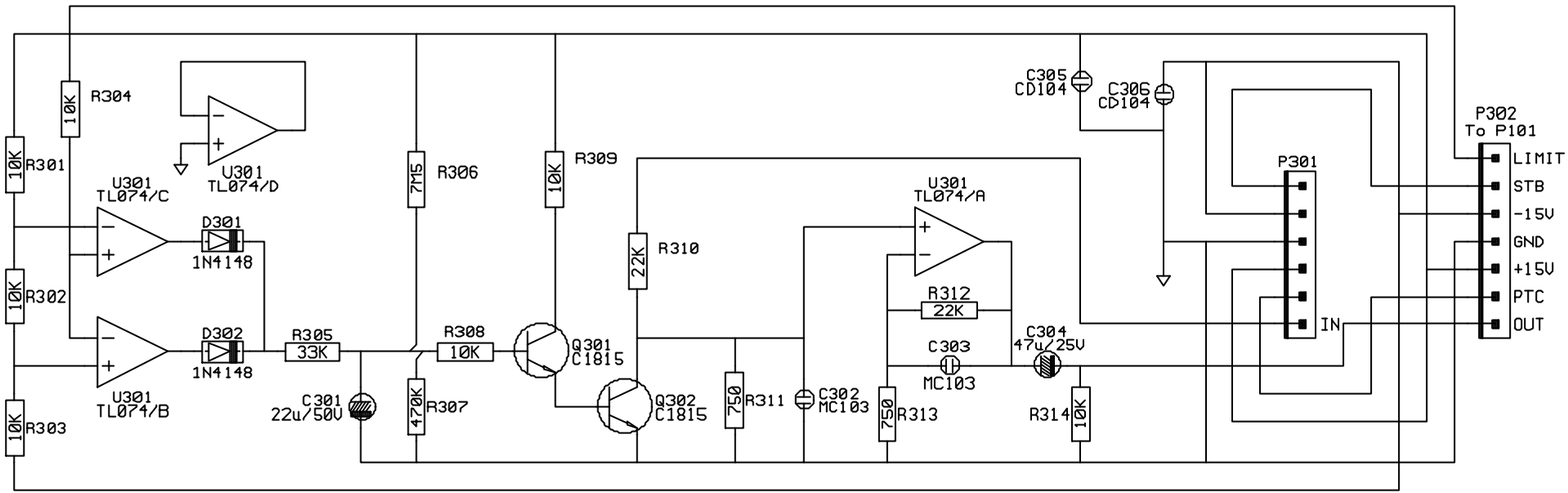
2SC1815

Q101,102,111,112,113,115,
118,206,207,208,301,302




JK203
LL-LFE I/P
R215
100
C209
CD473
47K
R219
C212
220p
D214 1N4148
+15V
D215 1N4148
-15V
U207
TL074/B
47K
R260
C228
1u/50V
R253
150
C231
10u/50V
D205
3V3
C230
220p
R252
150K
R251
47K
C229
47p
U203
4558D/A
D208
1N4148
R254
1K
C232
CD104
72K
R255
C233
220u/16V
R256
22K
SW201
SW201
2.8n
R257
Q207
C1815
D207
1N4148
D206
1N4148
Q206
C1815
R258
4K7
U203
4558D/A
R259
1M
R260
10K
Q208
C1815
C234
100u/16V
R262
18K
R264
10K
R263
22K
+15V
R265
1.2K
D209
Limiter
circuit
P201
OUT
PTC
+15V
GND
-15V
STB
L[M]T
+15V
-15V
R240
10K
R288
3K3
C225
22u/50V
C223
MC473
C224
MC104
U202
TL074/D
R236
18K
R237
10K
U202
TL074/C
R235
10K
R233
120K
C222
MC104
C221
MC104
R234
15K
R232
10K
U207
TL074/A
C219
10u/50V
R230
10K
R231
100K
VR201
50KA
C220
100p
HKTS 5


P101
LIMIT
STB
-15V
GND
+15V
PTC
IN
To PRE
D101
1N4148
+15V
-15V
PTC
+Vcc
-Vcc
R103 1K5
C103 47u/25V
R101 47K
U101 4558D/A
R105 3K3
R106 3K3
R107 3K3
R108 3K3
R109 6K8
R110 4K7
Q101 C1815
Q102 C1815
C105 1u/50V
R111 100
R112 47
R113 47
R114 100
R115 15K
R116 47
R117 56
R118 15K
C104
R104 56K
C106 CD473
R119 x
R120 100
Q103 2N5551
Q104 2N5401
C129 220u/10V
Q105 BD139A
Q107 TIP35C
R123 1K5
R121 0R1
R122 0R1
R124 1K
Q108 D669A
TIP36C
C130 220u/10V
R126 4K7
R125 39K
Q109 2N5551
Q110 2N5401
R127 2K2
C107 MC104
C108 CD104
R128 22K
R129 22K
AY101
R132 820
R131 150K
D104 1N4002
D107 3V3
Q113 C1815
P102
To Speaker
C110 100u/16V
C109 100u/16V
Q111 C1815
Q112 C1815
R130 4K7
Q114 A1015
R133 33K
R134 10K
C111 220u/16V
C112 1u/50V
D103 1N4148
+15V
C238 100u/16V
C242 100u/16V
C237 CD104
C241 CD104
C236 CD104
C240 CD104
C235 CD104
C239 CD104
-15V
HKTS 5
+15V
R136 12K
R135 1K5
R137 1K5
R138 3K
D105 1N4148
Q116 A1015
R143 1M
R141 1K5
R142 1K5
R144 3K3
U101 4558D/B
D106 6V2
D107 6V2
R139 12K
R140 470
C113 CD104
Q115 C1815
R145 15K
D108 1N4148
+15V
-15V
Q117 D882
R146 330
R152 1K5
C116 CD102
R148 680
R147 4K7
C117 100u/16V
C115 CD104
C114 22u/50V
Q118 C1815
R153 1K5
D109 15V
C119 CD104
C118 22u/50V
R151 680
C120 100u/16V
R154 15K
R150 4K7
R149 330
Q119 B772
C121 6800u/50V
C122 6800u/50V
D110 KBL405
C123 MC223
C125 MC223
C124 MC223
C126 MC223
C128 MC223
C127 MC223
P103
GND
To P.T.


R304
10K
R301
10K
R302
10K
R303
10K
U301
TL074/C
U301
TL074/B
U301
TL074/D
D301
1N4148
D302
1N4148
R305
33K
C301
22u/50V
7M5
R306
470K
R307
R308
10K
10K
R309
Q301
C1815
Q302
C1815
22K
R310
750
R311
C302
MC103
U301
TL074/A
R312
22K
C303
MC103
750
R313
C304
47u/25V
R314
10K
C305
CD104
C306
CD104
P301
IN
P302
To P101
LIMIT
STB
-15V
GND
+15V
PTC
OUT

LIMITER